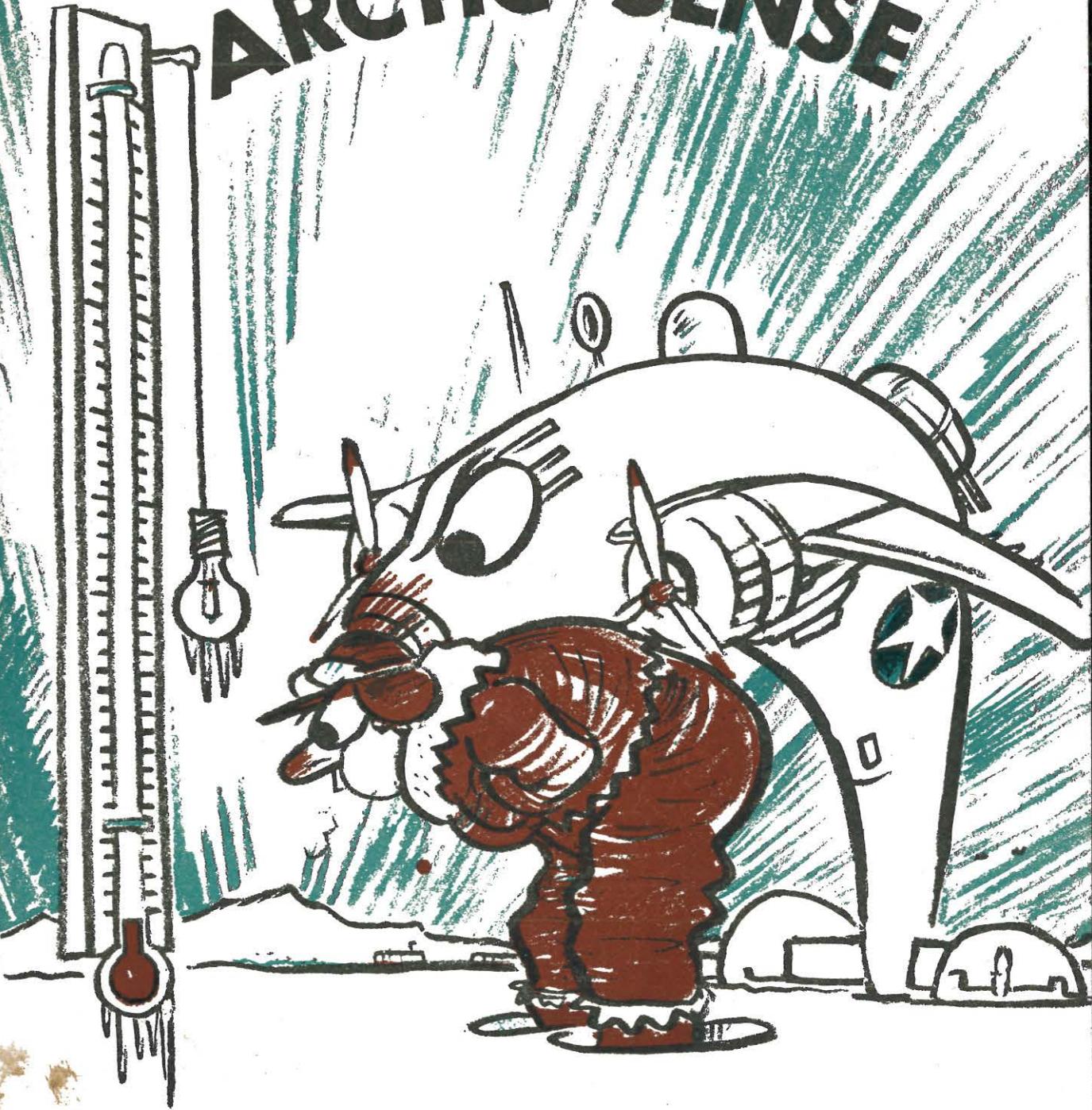


# ARCTIC SENSE

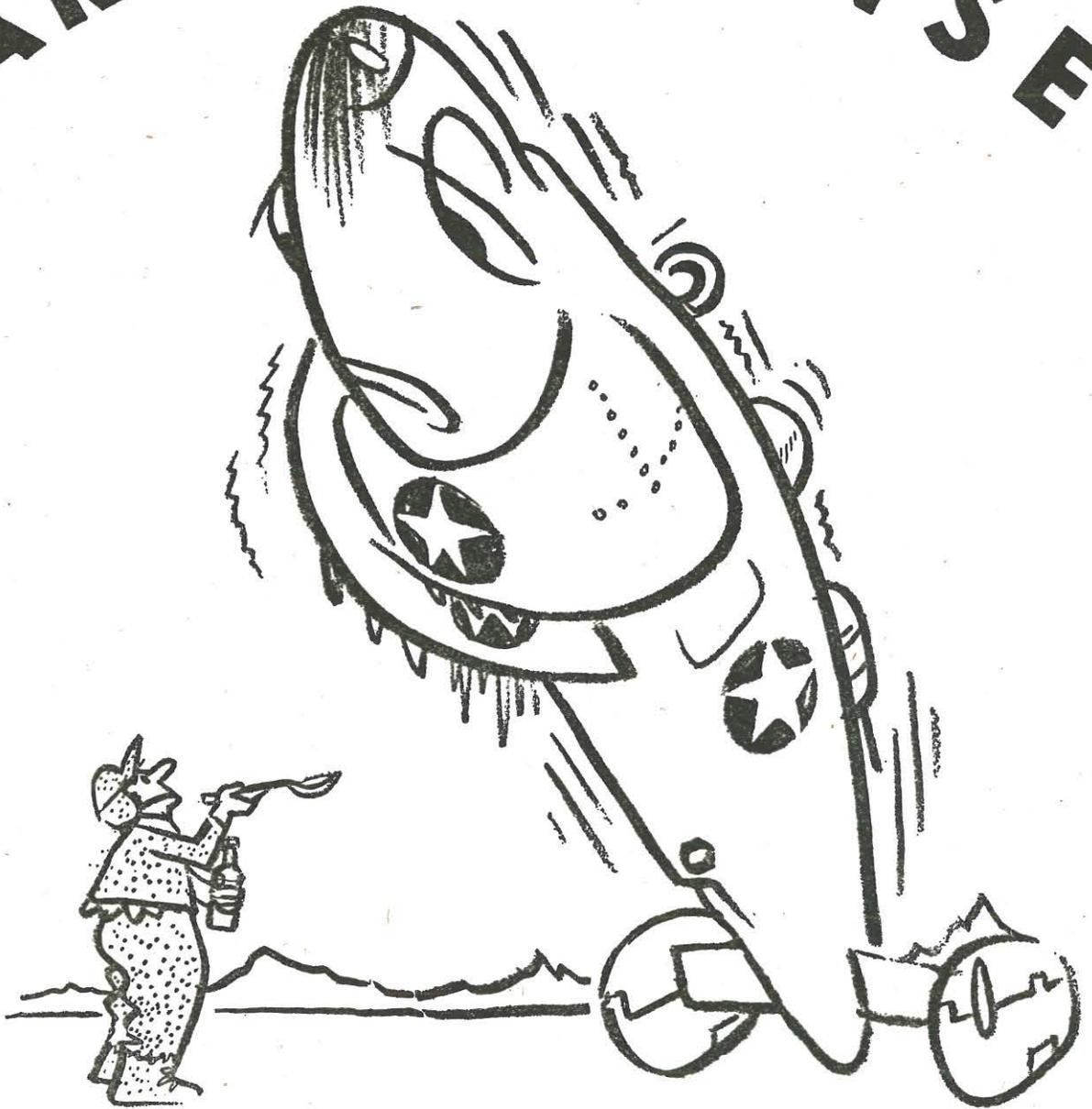


AVIATION TRAINING DIVISION, OFFICE OF THE CHIEF OF NAVAL OPERATIONS  
U. S. NAVY

NAVAER 00 80 Q-13



# ARCTIC SENSE



ISSUED BY AVIATION TRAINING DIVISION,  
OFFICE OF THE CHIEF OF NAVAL OPERATIONS,  
U. S. NAVY

1944

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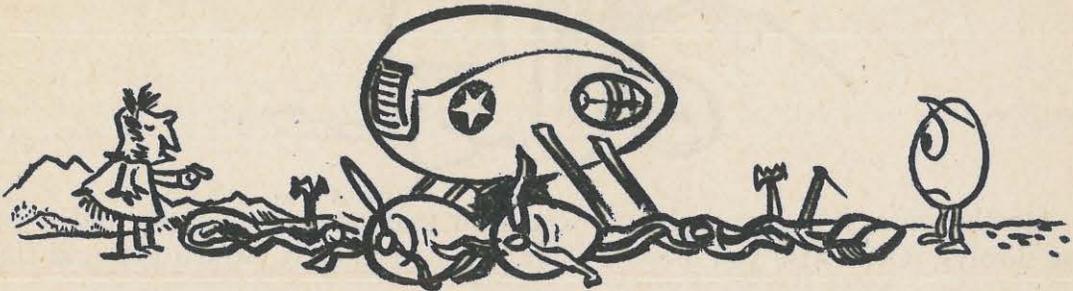
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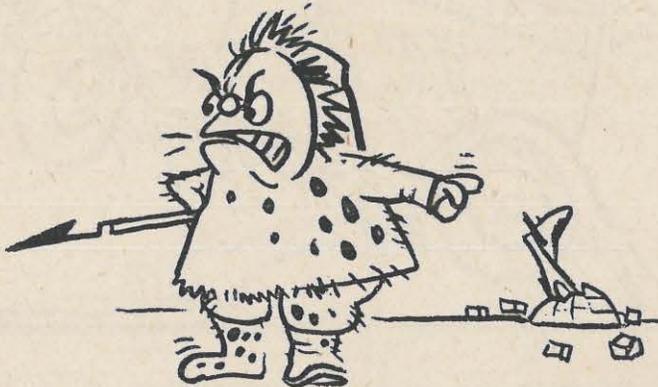
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## ARCTIC SENSE

In operating airplanes in the Far North there are several manners, customs, and usages to be practiced which are useful in keeping you from making an egg of yourself in front of the Eskimos.

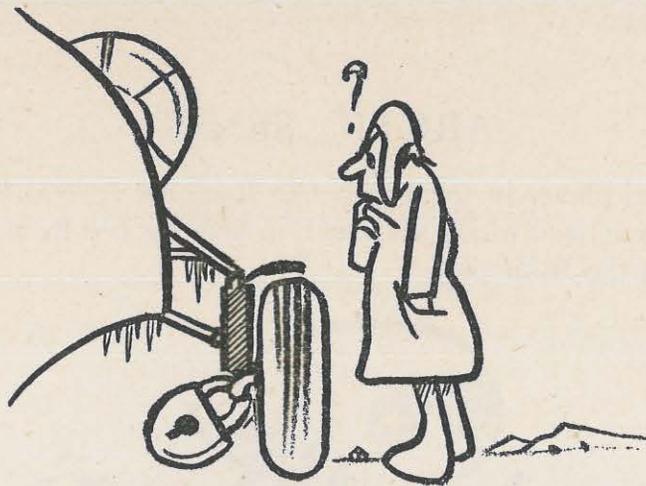


In flight, for instance, if you overlook precautions against icing, you may boost your stalling speed to a point where you wind up with your plane sticking out of the top of an igloo. The Eskimo looks upon his igloo as his castle, and he may regard this as an unfriendly act.

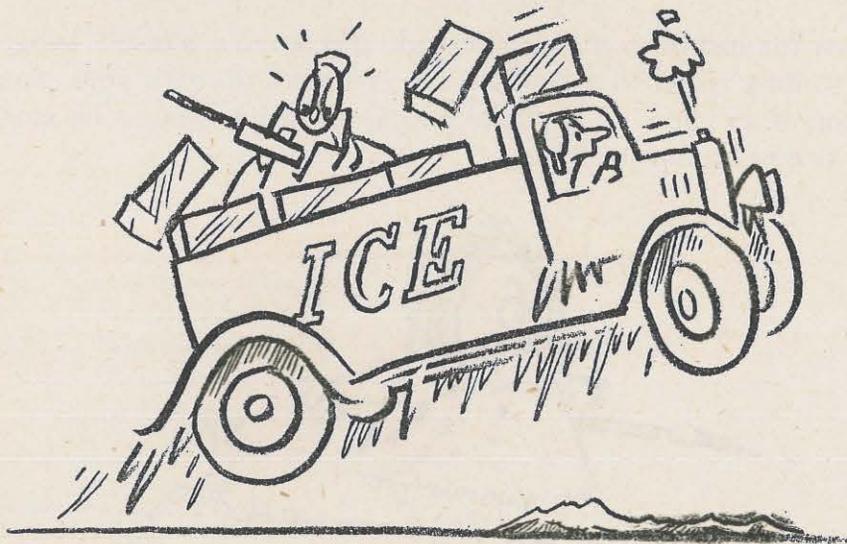


On the ground also there are certain practices to be observed. Parking your plane with the brakes locked "ON" will insure your plane staying right where it is—probably until the spring thaw. While this may give you the chance to win

hosts of friends among the natives, it will lose you the admiration of the Operations Officer—an experience more devastating than tangling with several Zeros.

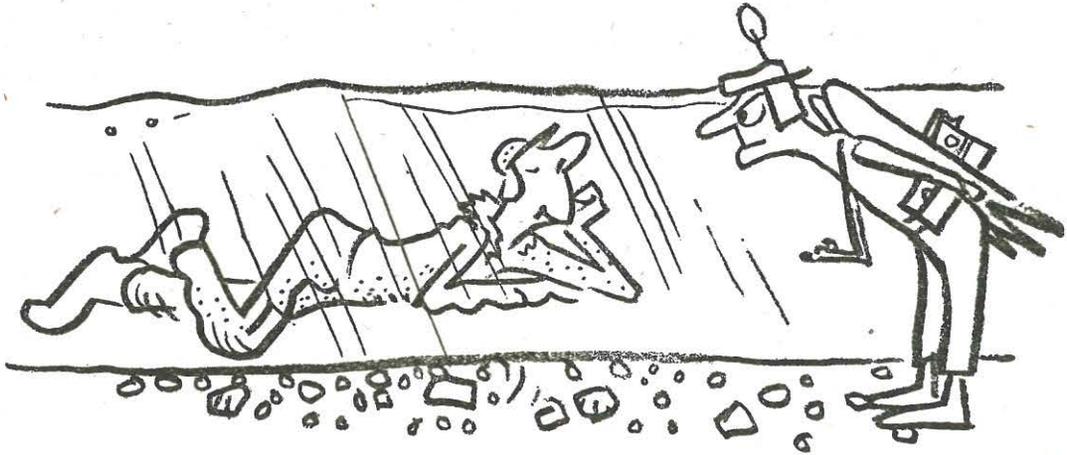


On the water it's a good idea to keep your taxiing to a minimum and to proceed slowly. Otherwise you'll cover your plane with spray, which is a bad thing



because the spray turns to ice, and the airworthiness of ice has never proved satisfactory.

So unless you are interested in sitting on an iceberg for the duration, or emerging as a well-preserved fossil from the Great Glacier in the year 21,943 A. D.,

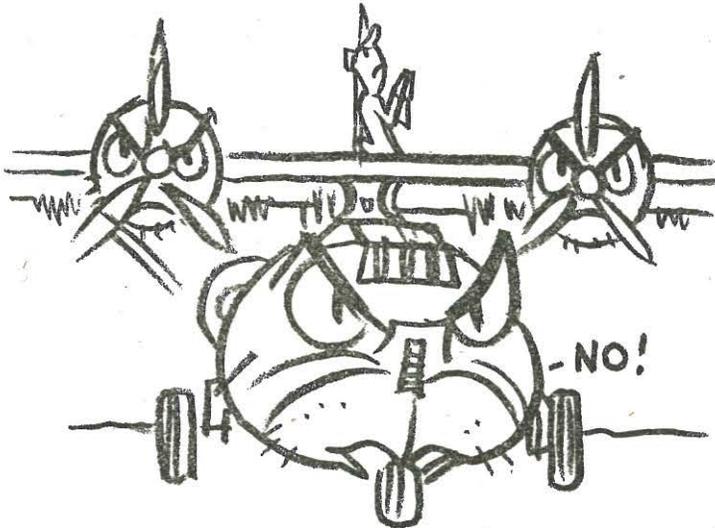


you'll want to give heed to the advice in this booklet on the rules that comprise Arctic Sense.

#### WHEN YOU PARK A PLANE ON ICE

in the Arctic, you must be certain of two things:

1. That it's going to stay there until you want to take it away. (There is no future in finding that your plane is wandering around on an ice floe with the Japanese current taking it farther away from you every minute.)



2. That when you want to take it away, it's going to be in a frame of mind to cooperate. (In case you think a plane can't have a mind of its own, try starting it in subzero weather without preheating the oil!)

There are several ways to make your plane behave. The first, of course, is to make sure of the surface beneath when you park it. Wherever there is ice or snow, it is a good precaution to put a layer of fabric, straw, green boughs or other insulation under the wheels so they won't stick to the surface.

Otherwise, when your plane is moved, you are likely to find that your tires have stuck to the ice and have carpeted the surface with two parallel strips of rubber.

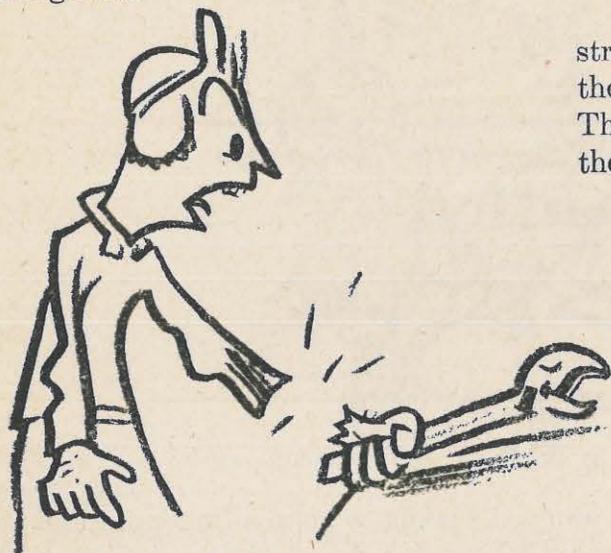
Your brakes should be locked "OFF," because if they aren't, ice may form through condensation in the brake linings and lock them. As tires do not make good skis, this is a disadvantage at the take-off.

To make sure your plane stays put, it's a good idea to provide mooring anchors. A mooring line can be made fast to a log or heavy branch, which is then buried in the snow. After water is poured over it, the anchor freezes solidly and is secure. Sacks, boxes, and other containers can be filled with sand or gravel to serve as anchorage points.

When parking on ice, two holes may be drilled about a foot apart, and the mooring line passed under the solid-ice crosspiece between the two holes. The ice may be too deep to penetrate, but two pits can be dug and a hole chipped through the intervening ice barrier to serve as the anchor point.

Other mooring methods may be devised, but under all circumstances, mooring lines must be taut to keep the plane from rocking in the wind. A slack line is dangerous.

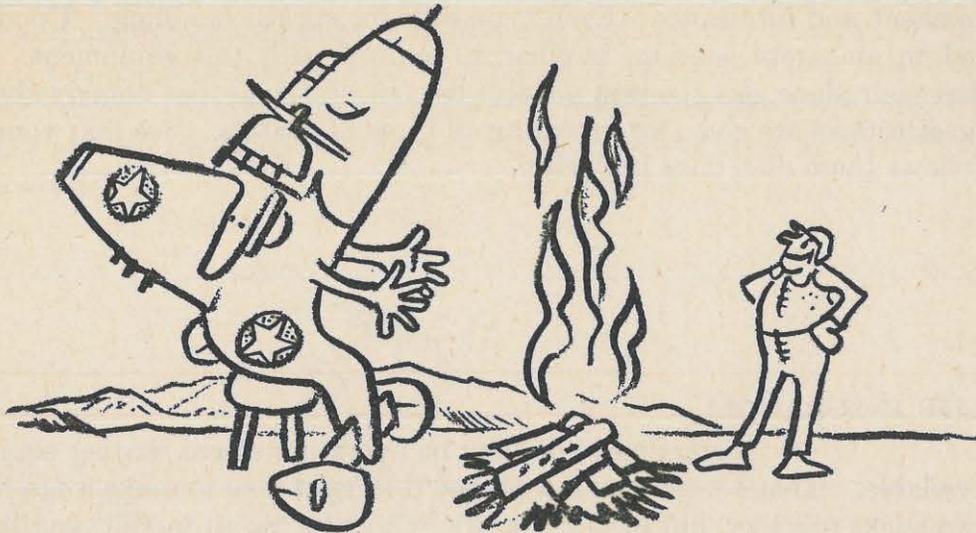
By the way, your crew must be instructed not to touch metal tools with their bare hands in freezing weather. The skin will come off on the metal when they put the tools down.



## YOUR PLANE HATES THE COLD

Should you have to leave your plane out in the cold, you probably will have to humor it to get it back to normal flying condition.

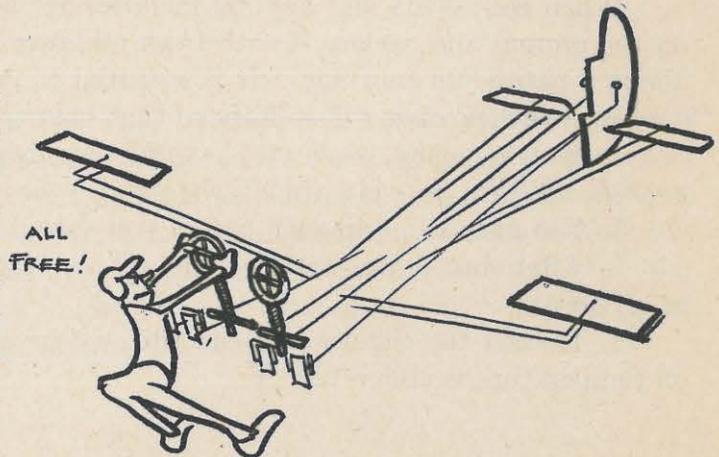
When you have to leave your aircraft parked out for the night, leave the escape hatch or some other hatch partly open so that air can circulate in the cabin or cockpit. This will prevent the windows from frosting up. When your plane is to



remain on "alert," heat must be applied to the turrets, bomb sights, and other armament equipment so that they are always ready to go.

Before you try to fly your plane, make sure that *all* ice and snow are cleared from the fuselage and plane surfaces. Never take off with even light frost on the wings. Whenever you suspect prop ice, clean it off, or use the anti-icer while running up the engines.

When there are sharp temperature changes from moderate to extreme cold, condensation may cause ice to form *inside* the wings and hull, as well as on the outside surfaces. Usually heat is the only way to get rid of it, as chipping may damage the plane. But you must make sure that all controls and mechanisms are free and unobstructed.



You should make sure also that fuel-tank vents are free from ice, since condensation may cause droplets of water to form in the vent line. This will freeze and cause stoppages. In extremely cold weather, water also condenses in the fuel and oil tanks, and therefore the sumps must be drained frequently.

Whatever you do, *don't* use a blow-torch on the outer surface of leakproof tanks to heat their contents. The liner will melt and foul the oil system.

There are various types of equipment in use for heating parts of your aircraft, its armament and lubricants. Each type calls for special handling. Upon being assigned to an Arctic station, familiarize yourself with this equipment. Make sure that your plane gets the best possible use out of it, and that nobody abuses it. Specific directions are given for operating all types of heaters. See that your plane crew follows these directions implicitly.

### IT'S LIFE INSURANCE!

Sometimes you may be operating where heating equipment isn't available. That's when you'll wish you'd learned how to make a fire by rubbing two sticks together, but even if you weren't a Boy Scout in your youth, there are some things you can do that will mark you as an expert mechanized woodsman.

After a flight when temperatures are 20° F. or below, and immersion heaters aren't handy, drain all your engine oil into clean containers and store them in a shelter where the temperature is above freezing. If you haven't any warm storage space, heat the oil on a stove or any other source of heat until it is free flowing, then pour it back into the oil tanks *immediately before starting the engines*.

When containers and heating facilities are not available, drain all the oil out on the ground and replace it with fresh oil later. Never mind what you've heard about a petroleum shortage. It is essential to get the oil out of the crankcase in subzero weather, or it will solidify so that you *can't* get it out.

In an emergency, when you have no containers or heaters, *if the temperature is not below 20° F.*, here is a trick for starting your engine that often will work:

1. Use normal oil dilution before you shut down your engines.
2. After shut-down, drain enough oil to bring the oil level down to two-thirds of capacity.
3. Restart the engines and run with covers over the cooler, if necessary, until oil temperature is above 122° F.

4. With the engines still running at 1,000 r. p. m., add enough gasoline at the oil filter neck to fill the system. This gives you a 2:1 ratio of oil to fuel and will dilute the oil adjacent to the tank hopper.

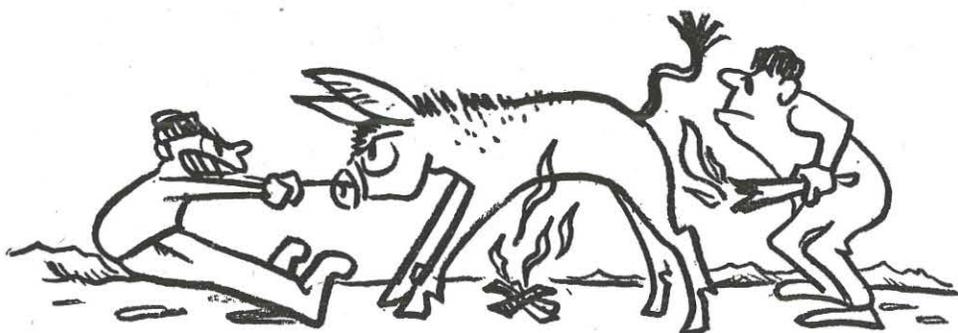
5. Shut the engines off, and restart after 20-30 minutes and give a second normal dilution procedure, followed by a final shut-down.

*The procedure outlined is strictly an EMERGENCY MEASURE.* Remember that when the fuel evaporates, your normal oil supply is reduced, and that has to be enough to get you to a new oil supply.

If you are encountering extreme cold and have no way to keep your engines warm, it may be necessary to keep them running at frequent intervals during the lay-over period. You can do this, however, only when you have sufficient fuel available to keep the engines warm, *and to fly you to the nearest place where you can get more fuel.*



If you have a warm place to store your battery, it is a good idea to remove it from your plane when the temperature drops to 20° F. Lacking a storage place where the temperature is above freezing, there is no point in removing the battery. It may be necessary to build up the battery with a portable generator before you can start the engine. In any event, *never* operate electrically heated flying suits, turrets, or other electrical devices unless there is a generator in operation. They pull the battery down too fast when it isn't recharging.



## STARTING THE ENGINE

It takes considerable priming to start an engine in cold weather. Turn the engine over by hand three or four revolutions. Give a priming, then engage the starter, and while the engine is being turned over, give the primer several short, sharp strokes until the engine catches.

When you have a suitable heater, you can get an easier start by directing a hot-air blast into the carburetor air intake, but be careful not to injure the equipment, your crew, or yourself. If you haven't a heater, you sometimes can get an easier start by placing a hot rock immediately in front of the carburetor air inlet. Don't let it fall into the intake!

Moisture forms quickly on spark plugs during cold-weather starts. After three or four unsuccessful attempts, it's good to take at least one spark plug out of each cylinder and heat them to around 150° F. to remove the ice and to dry the points.

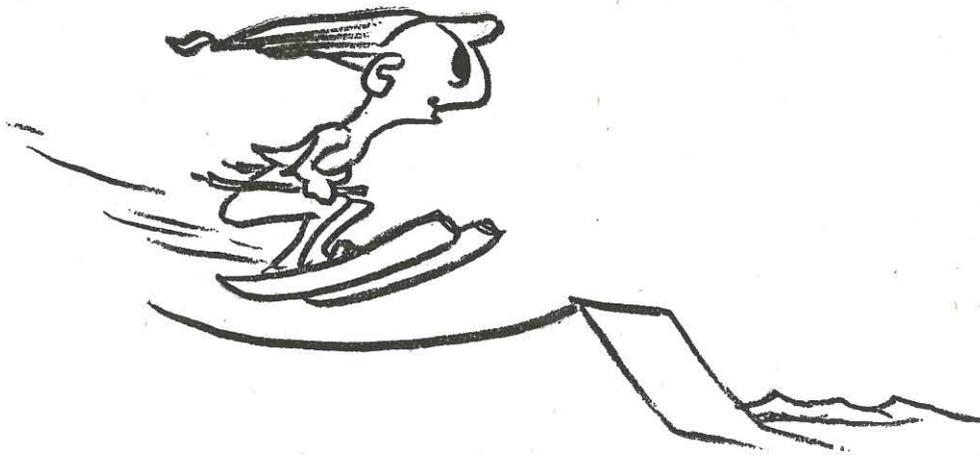
Warm-up can be hastened if carburetor air is put on hot as soon as the engine is firing regularly. But apply the heat slowly, and only in the amount the engine will take without backfiring.

## GETTING OFF THE GROUND, AND GETTING BACK

If the snow is heavy enough to interfere with your take-off run, but isn't deep enough to keep you from taxiing, taxi slowly up and down the take-off course several times to pack down a runway before you try to take off. The depth and hardness of the snow and the size of your plane's wheels will determine whether take-off or landing is practicable.

In landing or taking off on a narrow strip of clear ice, watch out for cross winds.

Your plane hasn't much traction, and therefore it hasn't much maneuverability. If the wind is gusty, the plane may be blown off the ice entirely before you can regain control of it.



If your aircraft is on skis, special technique is called for. It usually is necessary to break them loose from the snow before take-off, and it's highly desirable to make sure that both skis are loose, or the plane will pivot and twist its under-



carriage. You can break the skis loose by jarring them with a heavy piece of wood or by having the crew rock the aircraft violently with the engine running. Generally, you can avoid this difficulty by parking your plane with the skis resting

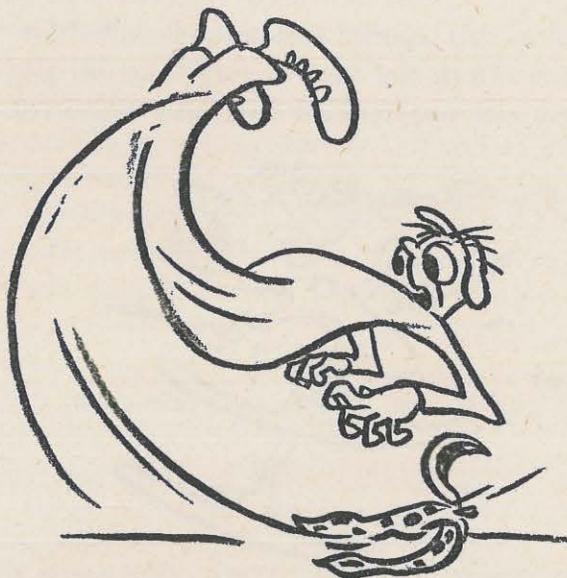
on planks, cloth, or even spruce branches, since this will prevent the skis from freezing to the ground or snow.

It's a good idea to have one or two stiff corn brooms stowed in the plane to sweep frost or snow from the wings. The leading edge, particularly the upper curvature, and the forward part of the upper wing surface, are the critical areas. Spruce boughs, if trees are available, can be used as brooms.

### TAKING OFF

In taxiing, skis will stick if you stop, and unless the snow is hard and well-packed, a fully loaded airplane is hard to break loose again without a ground crew. If you have to stop, taxi in a circle two or three times and stop the plane in its own tracks.

A plane is hard to steer on skis, and usually a ground crew is essential for parking in a confined space. It's good practice to have a line secured to each landing gear strut in order that the ground crew may assist without walking in the slipstream, which can cause frostbite on a cold day.



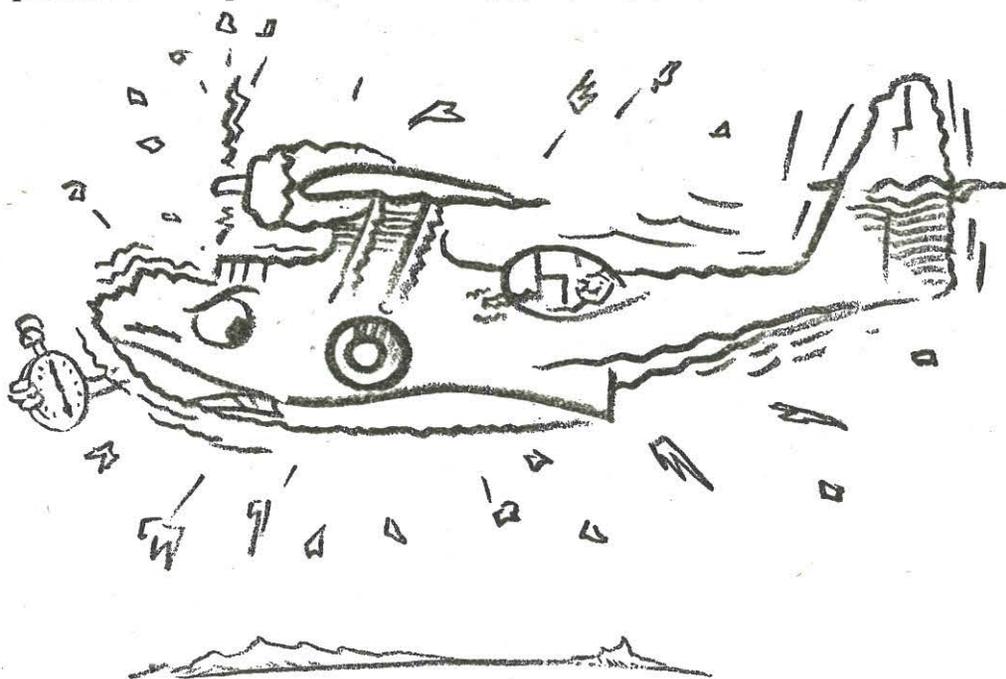
A plane has a tendency to skid while taxiing on skis, so watch it on the turns to make sure it doesn't get out of control and slide into a drift. If you encounter slush, keep moving until you reach dry snow again.

In taking off, you can shorten the run on skis by a technique similar to a sea-plane take-off—dropping the tail slightly before placing it on the step.

When taking off from wet or deep snow on skis, it's advisable to make a set of tracks while taxiing downwind, then turn and make a take-off on these tracks.

## WHEN YOU'RE IN THE AIR

After a take-off, from snow or slush-covered fields, it's a good precaution to operate your landing gear, flaps, and bomb-bay doors through



a complete cycle two or three times to keep them from freezing in the "UP" position.

You have instructions on how to operate heaters, electric suits, defrosters, deicers, and on how to regulate shutters to maintain temperature within safe limits. Read them and follow them.

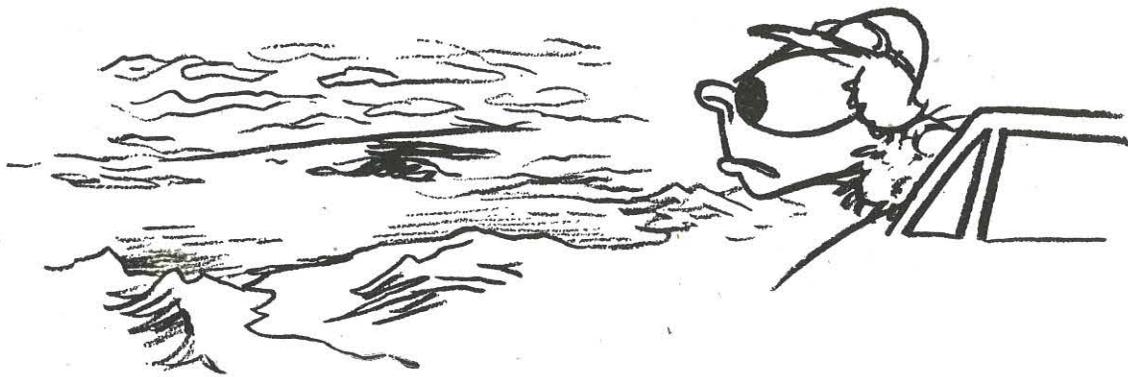
Temperature inversions are common in the Arctic, and the ground air may be as much as 90° F. colder than that at high altitude. The thing to do is avoid excessive cooling when you're letting down. You can do this by lowering your landing gear and using partial flaps to come down slowly. Keep plenty of power on, and regulate the shutters so that your engine doesn't cool off too quickly. If you can, keep the head temperature above 212° F. and oil temperature above 85° F. during all let-downs. Lower readings may result in your engine cutting out or failing when you advance your throttle.

In some planes an increase in the oil temperature may mean that oil is congealing in the cooler. You can correct this condition—and you'd better!—by closing the cooler shutters. During a long descent you can use the oil-dilution system to prevent congealing in the cooler when closing the cooler shutters isn't enough.

As you well know, carburetor icing is less likely under extreme conditions of cold than when free air temperature is between 30° and 40° F. It's not a bad idea, though, to apply some carburetor heat for a minute or two every half hour during flight to keep the adapter from icing up. It's also a good move to rev up the propellers about 200 r. p. m. and vary your throttle setting every half hour. It throws off prop ice and keeps the butterfly valve in the carburetor from sticking. Return to normal cruising conditions as soon as the tachometer shows that the cycle is completed.

Your gunners should operate their turrets frequently during flight. Once they figure out what would happen if the turret got sluggish just as a target came in sight, you'll probably have to caution them against keeping the turrets moving *all* the time. There's no percentage in wrestling with a reluctant turret when you are in range of a bandit. Gunners are amazingly quick to sense this.

Pilots who have explored the Arctic and Antarctic for years confess that they still are baffled by uncertain visibility conditions that they have encountered there. On the basis of their experience, you must be wary of your depth perception. With certain types of overcast it is absolutely impossible to distinguish the sky from the

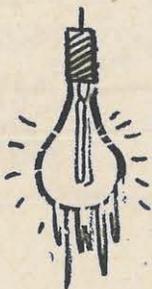


terrain, and it's like flying in a bowl of milk. Some Arctic tragedies have resulted from pilots trusting their depth perception under these conditions. There is an incident in which a patrol plane actually flew to a safe landing on an ice cap without the pilot being aware that he was anywhere close to the surface.

In sustained flight you generally can rely on your instruments to counter these conditions, but when you are coming in for a landing, you must rely on your wits. Flares which set up a black smoke will help you greatly in landing. If

these are lacking, about the best you can do is to jettison dark objects from the plane so that they will show up against the snow and help you to determine the ground level.

Whatever you do, don't underestimate the effect of Arctic lighting and weather on your depth perception. Rear Admiral Richard E. Byrd, whose experience in such matters is unparalleled, says it is the greatest hazard you can encounter in Arctic flying.



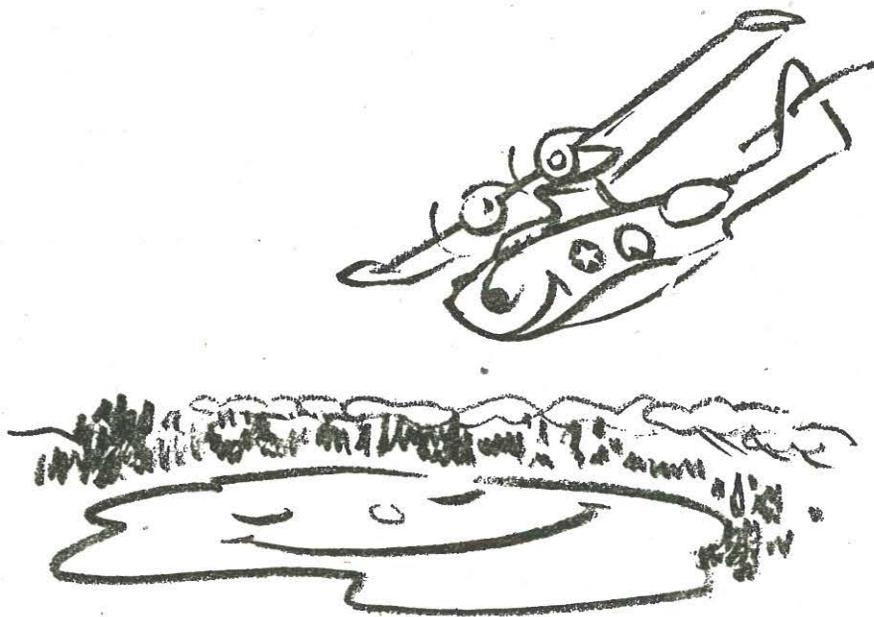
## ARCTIC WATER PILOTING

Don't cast off from a buoy as soon as an engine catches. In the Arctic, engines have a way of quitting on you unless they are thoroughly warmed up, and you want to make sure you aren't drifting around helplessly with no power, playing tag with a lot of icebergs.

Surface ice is a hazard to take-offs and landings. It should be standard practice in Arctic waters to have a boat patrol your take-off path so that you can be sure your course is clear. If there is broken ice, have a boat precede you over the take-off path, to clear the way for you.

You have been told before—but be sure you remember—*Don't Wait For Ice To Form*. PREVENT IT! Don't wait until you get ice, to go on alternate air. Shift as soon as you suspect that you may possibly get ice. (It might not hurt

you to review the booklet ICE FORMATION ON AIRCRAFT, which has been issued by the Training Division of the Bureau of Aeronautics.)



Before you land, drag the landing area and look over the surface of the water to make sure there is no ice in your proposed landing area. Many of your take-offs and landings will be at night, but usually lights will be set out for you by the tender or the shore station. In any case, if your landing is near the shore, remember that ice moves with the tides. Sometimes you can forecast its presence that way.

You'll get choppy seas in the Arctic, and therefore it's best to land your airplane full-stall in the daytime and power-stall at night.

It is a good idea to be familiar with inland lakes and airports. If visibility is bad at your base, you may want to use them as alternates.

Keep yourself and your crew as dry and warm as you can, not only for comfort but for protection. Boats should have canvas screens to keep from taking water and drenching all hands while en route to moored planes. It's impossible to keep flight clothes from getting wet, but you can change them. Hot food is a good antidote for chill. Fortunately, it's normal to want hot food and hot coffee in the Arctic climate.

You won't have any trouble indoctrinating your crew with the idea of keeping warm that way.



### IN CASE YOU CAMP OUT IN THE ARCTIC

In spite of anything glamorous you may have read by Jack London or Robert W. Service, it's no picnic to spend the night in the open during an Arctic winter. Don't do it if you can help it, and if you have to do it because of a forced landing, make it as easy on yourself as you can.



Every flight during winter outside the local area of established Arctic bases should carry the following equipment for each member of the crew, with priority in the order given:

1. Eiderdown sleeping bag.
2. Emergency rations and matches.

3. Emergency clothing:

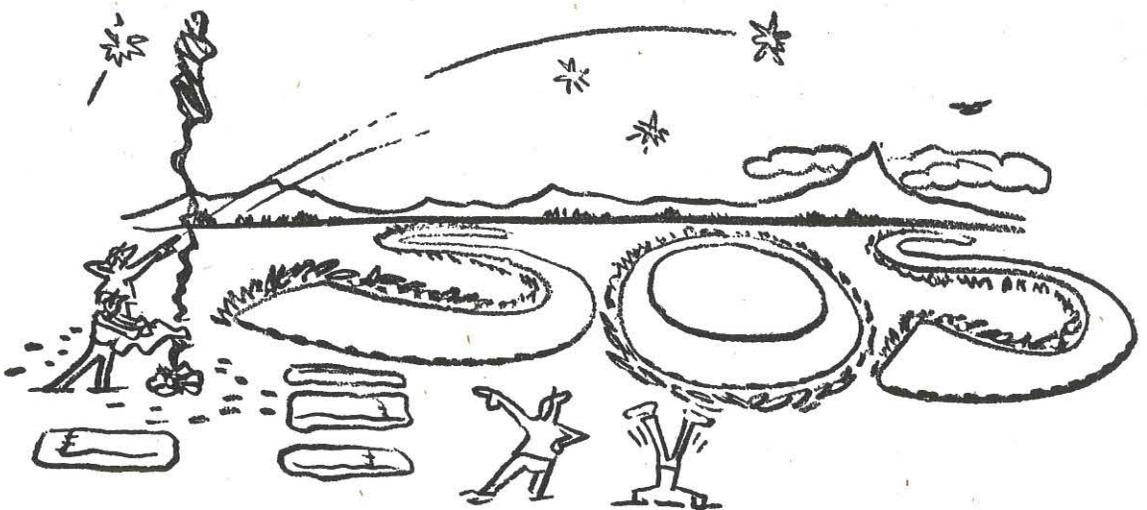
- Footgear.
- Parka.
- Woolen underwear.
- Woolen socks.

4. Emergency kit—gun, ammunition, fishline, fire-building materials, primus stove, ax, and other essentials.

There is no point in playing hide-and-seek with the pilots who are sent out to look for you if you are forced down. Stay on your prearranged flight course all the time. Except in extreme cases, it's better to land or crash land the plane than to bail out. Frozen lakes make good emergency airports, and you can crash land in many valleys, on slopes, and even on ice floes.

If you are forced down, first determine whether the plane is still flyable. Take every necessary precaution for starting the engine when you are ready to shove off. Then look at once to your own protection.

Set up emergency signals or improvise markers that can be seen readily. Be ready to fire your signal pistol or set up a smoke smudge if planes pass over head



It may be necessary to stay in the plane; but, generally speaking, additional comfort will be obtained if you establish a camp. A patrol plane hull has been called the coldest place in the world. Make camp in some nearby sheltered place and get together a supply of firewood. If worst comes to worst, you can drain some gasoline from the fuel sump to get your fire going. Even if your oil congeals, it will help in starting your fire.

Hollow out a place in the snow for sleeping, in a location that is protected from

the wind. Get as much sleep as you can with your feet toward the fire. If the cold wakes you, get up immediately and build up your fire, and warm yourself by exercising. *But don't get up a sweat.* Damp clothes will cause freezing. Take off whatever garments are necessary to prevent perspiring while exercising.

Don't attempt to travel unless you have adequate equipment and have had previous Arctic experience. *THERE ARE TWO EXCEPTIONS TO THIS RULE*—you should travel from your plane if you are positive of your position and know that shelter is within easy reach. And if searchers are not likely to reach you, you simply have to travel.



Above all, don't lose your head. You can survive many days without food if you relax and get plenty of sleep.

#### SIGNALS FOR SEARCHERS

Signal with colored parachute flares when you hear aircraft overhead at night.

Trample "S O S" in the snow, if it isn't too deep. Make the letters at least 200 feet high and outline them in evergreen boughs if possible.

Keep a fire going. If a plane is approaching, make smoke by throwing any of these materials on the fire:

Gasoline and oil mixture.

Chunks of congealed oil or animal fat.

Inner tubes, rubber hose, or floor mats.



### TAKE YOUR BEAR STEAKS RARE

Your emergency ration provides a balanced diet for as long as it lasts. It takes quite a lot of sugar and animal fat to keep you healthy over a long period of time in the Arctic. Fresh meat alone, if it is fatty, will keep you going for an indefinite period. *But don't overcook it.* Long exposure to heat ruins vitamins and leads to scurvy. Maybe you prefer having a well-done steak Bordelaise at Delmonico's but above latitude 50, you'd better eat your meat rare — or even raw—whether you like it or not.

### HINTS TO ARCTIC CAMPERS

If a forced landing makes you an unwilling member of the Arctic Camping Club, remember these do's and don'ts. They will save you some misery and help you to get back to the station, where you can bore your mess-mates with your experiences as an explorer:

1. Avoid sunburn and snow-blindness. You can get either or both in bright overcast as well as clear weather. Protect your eyes and face as much as you can. If you haven't colored goggles, blacken your cheeks and the bridge of your nose with charcoal. You can make an eyeshield by burning holes slightly smaller than your eyes in a piece of wood about a half inch thick and fastening it in place with a piece of cord. Don't use metal objects for eyeshades, and don't let metal objects touch your skin.



2. Use several layers of light clothing in preference to a single heavy layer—they are warmer. Inner clothes should be fluffy and porous; only pure wool underwear is suitable for the Arctic. Outer clothing should be wind-resistant and water-repellent, but should not be waterproof, because waterproof clothing won't permit the moisture on your body to dry. *Avoid overheating by exertion.* Perspiration can be as deadly as a ducking in ice water.



Tight clothing is dangerous, because it impairs circulation and increases the possibility of freezing. Wet clothing is another danger. Carry extra dry socks and underclothes. If you get wet, remove and dry the wet clothes as soon as you can, or you may be severely frostbitten.

You can dry clothing by laying it loosely on sticks in a perforated oil drum, with a small fire beneath the drum toward the back. You can also dry clothes by hanging them on sticks in the smoke of an open fire.

Damp clothing can also be dried by the heat of your body. A pair of socks or a suit of underwear, for example, may be dried by placing it inside your shirt during the day.

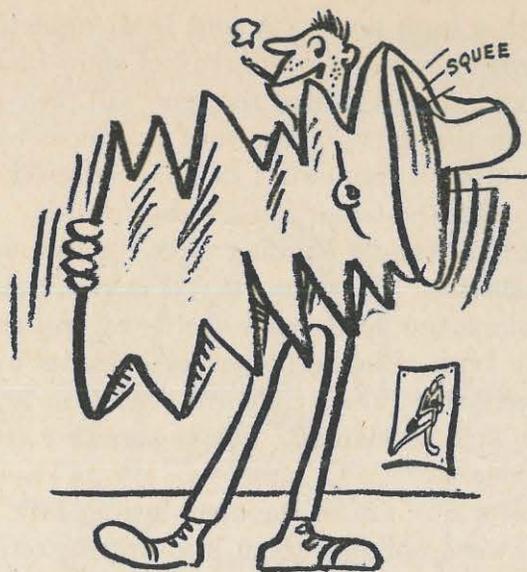
3. Tight shoes cause frozen feet. Your shoes ought to be big enough to let you wear two or more pairs of woolen socks. If you are traveling far on foot, you will need a felt or burlap inner sole. If there is even a remote chance that the temperature is going down to 20 below, keep your socks dry! You can't keep your feet from perspiring, but you can, and you must, change into dry socks. Remember, you are literally on your own two feet if rescue fails. (It is a good idea to tape your heels with adhesive to prevent blisters.)

It is equally important that you take care of your hands. Tight gloves cause your hands to freeze, and that is extremely dangerous. If they become numb,



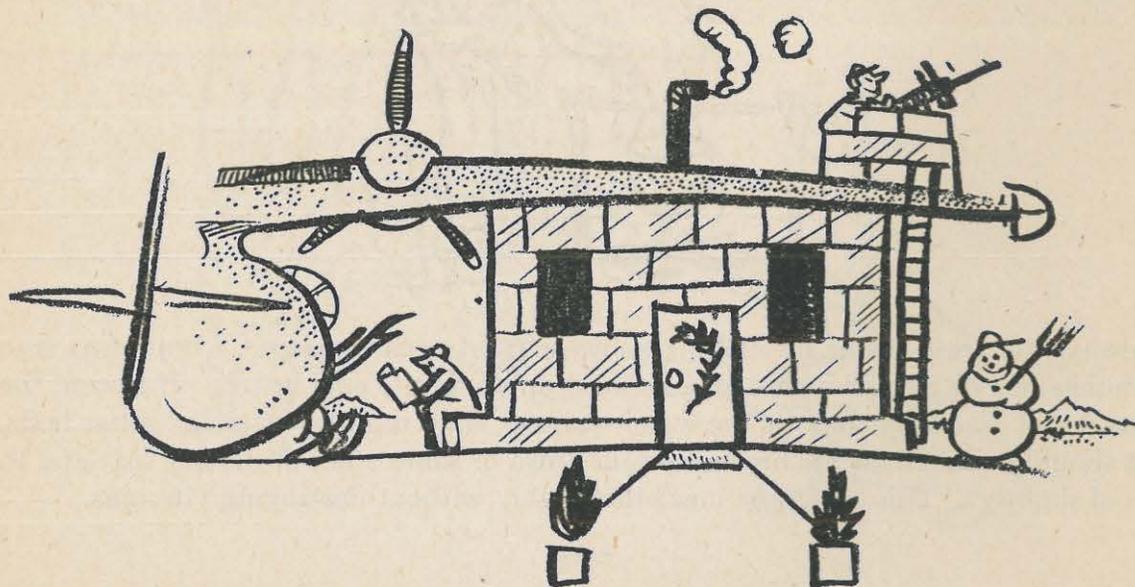
you can't even light matches. Make sure that you don't lose your gloves. It's a good precaution to have them tied to a string around your neck. If your hands get cold, warm them by putting them in your armpits or groin.

4. Only eiderdown sleeping bags are entirely satisfactory in the Arctic, and they should be dried thoroughly at least every 3 days. The less clothing you wear inside the bag, the drier and more comfortable it will be. During the daytime it is



necessary to get the warm air out of the bag, turning it inside out or putting your arm inside the bag and pumping it like a bellows. Otherwise, rime ice forms at the edges, and if this goes on day after day the bag loses its warmth.

5. Try to get a heated shelter built, if you can. (It takes a week to dry a handkerchief out-of-doors in the Arctic at 50° F.) Hard-packed snowdrifts can be hollowed out to provide shelter for one or two men under a canvas rigged on skis. If you need a semipermanent camp, you can cut blocks out of hard-packed snow to build a windbreak or a snow house like an igloo. It is also feasible to use the wing of the plane as a roof and build a four-walled shelter beneath it with snow



blocks chopped out with a bush hook. A tent is all right if you pitch it where it won't be covered by drifting snow; a windbreak of snow blocks, timber, tarpaulin, or engine covers on the windward side of the tent will prevent this. Incidentally, tent stakes won't work in the snow; fasten your guy ropes to poles and bury them. A lean-to can be made from a framework of poles covered thickly on three sides with evergreen boughs, with the twigs pointed downward.

6. Now, as to heat: A candle burning in a tin can will raise the temperature in a small tent or shelter. Of course, if you have a heater, that's the answer, but you can always make a fire inside your shelter, *if you provide sufficient ventilation*. By the way, any type of heater, whether it burns wood, coal, gasoline, or oil, produces carbon-monoxide fumes that are deadly in an unventilated shelter. It is an easy death, but very permanent. Make sure of your ventilation—sacrificing a bit of heat, if necessary.

Make a back drop for any fire in the open, using snow blocks or a tarpaulin. Put your logs on lengthwise, building them into a high tower. As you sleep, the logs will drop, but if they are lengthwise they won't fall apart and scatter, putting out your fire.

7. Don't neglect cooking. Take the time to prepare at least two meals a day—you need them. Boiling is the easiest method of cooking, because you can



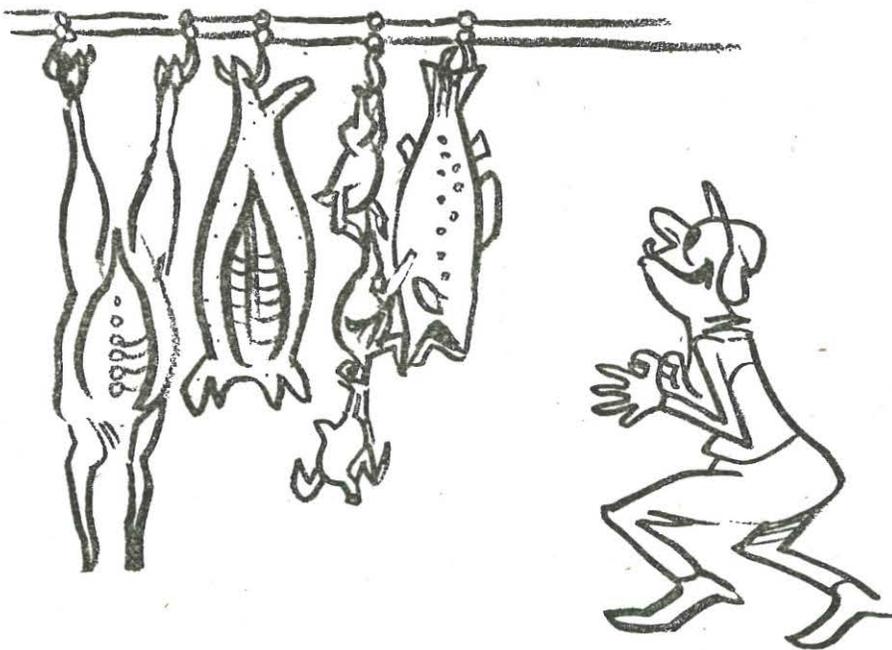
always get fresh water by melting snow or from open streams. Chop meat into chunks of 1 or 2 cubic inches in size and drop them into cold water. If frozen, the meat will gradually thaw as the water warms. Two minutes after the water boils, it should be taken off the fire and set on brush or some other insulating material to cool slightly. This cooks the meat thoroughly without destroying vitamins.

Fish should always be boiled if possible. Small animals or small chunks of meat can be roasted over an open fire on a stick. Meat should be cooked rare and without removing the fat. Any excess fat can be used for lamps and heaters. Lack of fat makes rabbits a welcome addition to your diet, but don't try to live on



them, because a straight rabbit diet will lay you low in a week. Meat of seals, caribou, musk oxen, owls, ravens, ptarmigans, and salmon is the principal food supply of the Arctic. You can do all right on it, too.

Seal meat spoils easily, even at low temperatures, if exposed to the air. Bury it in the snow and it lasts almost indefinitely, and so will almost any other fresh animal carcass.



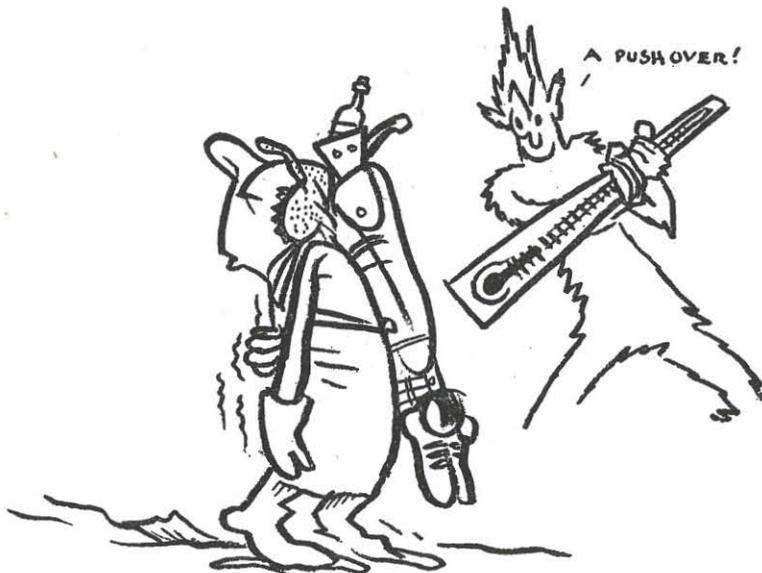
## SHOW ME THE WAY TO GO HOME

Suppose you have to hit the trail, because you're sure you can get to a permanent shelter, or because you're sure nobody's coming to get you—here are some rules that will help you:

1. Follow frozen streams. They offer the easiest paths to travel and usually lead to habitations. But beware of snow-covered ice, which may have treacherous concealed weak spots. Go downstream, because that will take you to the coast, where there are posts and towns.

2. Avoid frostbite, which you can detect by a grayish or whitish appearance of the skin. It usually attacks your hands, feet, nose, cheeks, forehead, and chin. You can thaw out your face by holding your hand on the frozen area until circulation is restored. *Don't rub it and don't put snow on it.*

3. Avoid overexertion. Deep breathing can cause frosting of the lungs, and this will lay you up for several days. Exhaustion is what causes freezing to death,



and this is frequently caused by keeping awake and keeping moving instead of resting. Don't be afraid to sleep. Unless you're exhausted, you'll wake up before you'll ever freeze.

4. You must have a reliable compass to travel on the ground. If you haven't a pocket compass, take the instrument out of the plane. Don't bother with an electric flashlight, but candles are fine. Take anything else from the plane that is

useful. If the load is too heavy to carry, you can make a sledge from the cowl structure. Remember that it's easier to drag a sledge than to carry the load.

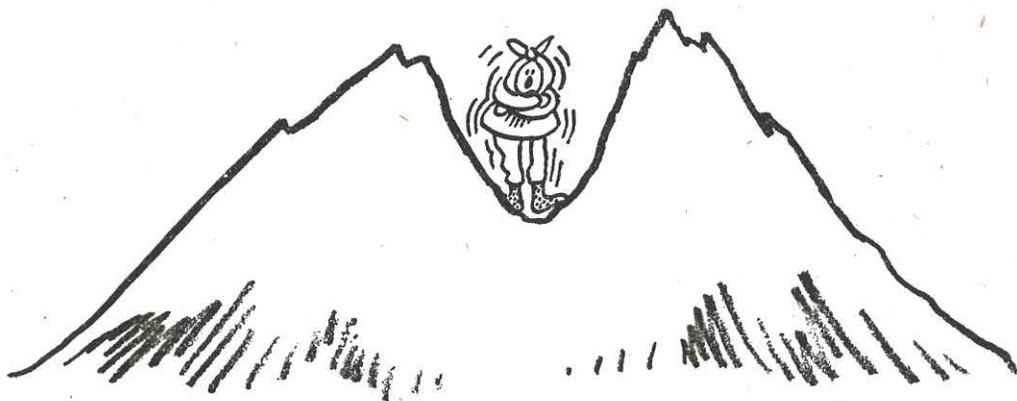


#### THIS ISN'T INTENDED AS A GUIDEBOOK

There is no room in this book to give you detailed information on the Arctic, but here is some general information on the region that may interest you, and perhaps may even help you to win a few bets.

There is an ice cap in Greenland that is 8,000 feet thick. Only the coast line is suitable to support human life—if you call that life.

Alaska consists of mountain ranges and many valleys. The coldest parts of the country are the valleys between high mountains. Its coast line is rough and rugged. There is *no timber* on the Alaskan peninsula, Aleutian and Bering Sea



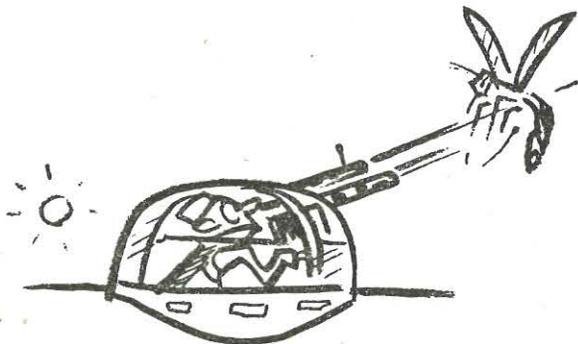
Islands, and none on the coast line at Nome. Most of the land is covered with brush which is buried in snow in the winter. There is also much swampy land in Alaska that is difficult to travel in summer.

Arctic Siberia is like Alaska, although the vegetation is quite different.

Much of the Arctic Ocean is covered by drifting ice packs which are in motion during all seasons of the year. Planes can land on pack ice if the surface condition is suitable. During summer, much of the surface is mushy and the pack breaks up into fields or floes. Even a relatively small floe is livable for a man if he has enough



food, or can knock over a seal. Polar bears are edible, too, if they are young (and if they are dead). But the *liver* of the bear is poisonous. Don't eat it!

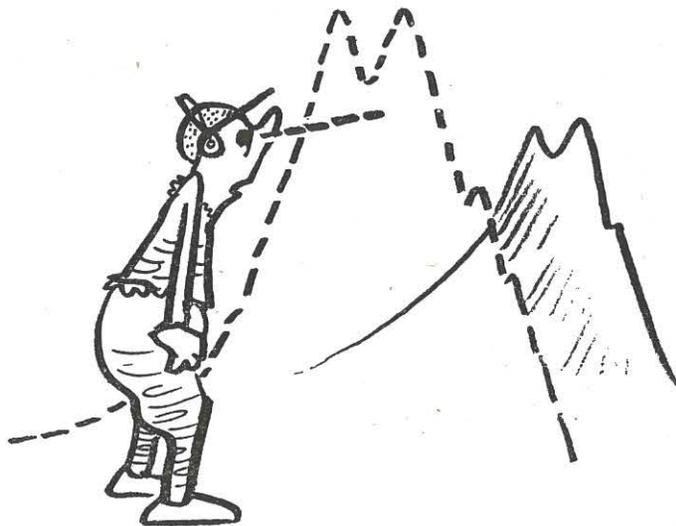


In the swampy parts of Alaska, the mosquitoes are a real menace in the summer. People have died from their bites, and a head net and other suitable protection against them are absolutely necessary. (Imagine going through what you've been through and getting killed by mosquito bites!)

Across the entire Arctic from Canada to Siberia, there is low quality coal in river valleys. In northern Alaska there is usually driftwood to be found on the western beaches.

Arctic air, at low temperatures, is very dry.

Visibility is much greater in cold weather than in warm, so don't make the usual tourist mistake of misjudging distances. An object 10 miles away looks only



a mile or two away. This makes a difference, if you're on foot. Moonlight is bright enough for landing. It is never pitch dark in the polar circle except over the open sea.

The Aurora Borealis is not dependable as a source of light because of fluctuations in its intensity, but it's a help to traveling, nevertheless.

Under certain conditions of overcast when the ground is snow covered, light is so diffused that you can't distinguish between land and sky. There's no answer to it but to go on instruments. If you are trying to land, it is wise to throw overboard smoke flares, engine covers, or other objects that will show up against the snow and locate the ground level for you. (We said this before, but it can't be overstressed.)

In the interior of Alaska and in northern Canada, it is customary to lay spruce bows on top of the snow to mark the runways and aid in depth perception. (A B-26 pilot crashed his plane at Watson Lake through not knowing this.)

Sound travels much farther in extreme cold. Experts on the Arctic report that you can hear a dog bark 10 miles away. They do not state how far away you can hear a wolf.

Frost forms very quickly; precipitation is light—what looks like a heavy blizzard is usually loose snow being blown along by a strong wind.

Winds of the Arctic are generally overrated. High winds are usually local and in regions where high land faces the open sea. Gales seldom extend more than 15 miles inland. Farther inland strong winds are infrequent and never combined with extreme cold.

Coast lines have heavy fogs in spring and fall and moderate fogs in summer. Winter fogs are rare.

There is another hazard in the condition called "Sastrugi," a series of small, tightly packed snowdrifts that look like ocean waves. They are 10 to 20 inches deep and make landings hazardous. You can land, however, if you come in parallel to the drifts.

The so-called sky map is a big help to travelers on foot or in the air. A uniform overcast of clouds reflects the terrain. Snow-covered surfaces reflect white



against the clouds. Blue or green ice shows as grayish patches on the sky map. Open water, timber, and snow-free terrain are black against the sky. This indication may help to get you home.

One last note of general caution: Eskimos kiss by rubbing noses. From your standpoint, this is strictly a spectator sport. *Native girls aren't good for aviators.* Remember this, because, if you don't, you may learn one of life's little lessons.







